

Report Methodology

The “Report Methodology” appendix provides an explanation of how the DTC calculated the availability, adoption, and service quality estimates provided in the Competition Status Report (Report). The source of the most detailed and accurate industry-related data is the carriers themselves. However, the DTC currently lacks the necessary authority to compel production of much of this data, except that already required to be reported to the DTC. For other data, the DTC believes it has authority to compel production, but the litigation process of compelling production of that data would have taken too long for such data to be of use in this report. Therefore, for much of the industry-related data presented in the Report, the DTC relied upon a combination of secondary sources and estimates derived from more granular demographic data.

For each industry-related Figure and Table presented in the Report, this appendix provides four pieces of information. First, a general discussion of the process for the calculations and estimates is provided under the heading “Method”. That is followed by an informal bibliography that lists each data source utilized in the calculation and presentation of the data under the heading “Sources”. Under the heading “Confidentiality of Data”, there is a numerical link for each of the Sources discussed in the previous heading. For each data source indicated, the DTC identifies the availability to publicly access the source data. For most situations where the most granular data is not publicly-accessible, the DTC identifies publicly-accessible reports from the author of the source information. Under the final heading, “Potential Errors”, the DTC attempts to summarize the causation and, where possible, direction of inaccuracies that may result from the DTC’s calculations and estimates.

1. Residential Wireline Voice Service

1.1 Availability

ILEC Availability (see Table 2; and Figure 2): **Method:** (a) As a "Provider of Last Resort," ILEC is obligated to make reasonable efforts to offer service to every household within the ILEC territory; (b) ILEC covered percentage: estimating number of households with access to Verizon’s and Independent ILECs’ services, by overlaying map identifying point-specific locations of residential structures with Massachusetts Community Boundaries. **Sources:** (1) Massachusetts Land Use, 1999, Massachusetts Office of Geographic and Environmental Information (MassGIS); (2) US Census 2000 population Tiger files reprocessed through MassGIS, 2003; (3) Community Boundaries Map, MassGIS. **Confidentiality of Data:** (1) None, MassGIS Land Use data is publicly available, see <http://www.mass.gov/mgis/lus.htm>; (2) None, US Census population data reprocessed through MassGIS is publicly available, see <http://www.mass.gov/mgis/census2000.htm>; (3) None, MassGIS community boundary data is publicly available, see <http://www.mass.gov/mgis/towns.htm>.

Cable Voice Availability (see Figures 3-4; and Table 3): **Method:** (a) Identification of cable provider within each municipality determined through cable franchise licenses (308 municipalities with at least an Incumbent provider); (b) Number of households passed determined by overlaying electronic street-level cable plant maps with map identifying point-specific locations of residential structures (284 municipalities with electronic cable strand maps); (c) For those communities where no electronic cable plant maps were available (24 municipalities), the Department of Telecommunications and Cable (DTC) estimated number of homes passed as required by cable franchise license agreement. For those municipalities without a full-build-out requirement in franchise agreement, DTC estimated number of households captured within the negotiated density requirement by overlaying Land Use dataset with

NAVTEQ Roads data layer; (d) DTC utilized Cable Rate cards to identify those municipalities where Cable Voice is a service offering from the licensed provider; (e) For Overbuilder providers, availability estimates are based upon cable plant of the Incumbent within a licensed community. **Sources:** (1) Cable plant maps provided by individual carriers as of Summer 2008; (2) US Census 2000 population Tiger files reprocessed through MassGIS, 2003; (3) Massachusetts Land Use, 1999, MassGIS; (4) Community Boundaries Map, MassGIS; (5) 2008 Cable Rate Cards to identify those municipalities where Cable Voice is a service offering; (6) Street Geocoding Data for Massachusetts, NAVTEQ, Chicago, IL, May 2008, through MassGIS. **Confidentiality of Data:** (1) None, cable plant maps for all cable companies are publicly available per statutory requirement as part of the cable licensing process; (2) None, US Census population data reprocessed through MassGIS is publicly available, see <http://www.mass.gov/mgis/census2000.htm>; (3) None, MassGIS Land Use data is publicly available, see <http://www.mass.gov/mgis/lus.htm>; (4) None, MassGIS community boundary data is publicly available, see <http://www.mass.gov/mgis/towns.htm>; (5) None, Cable Rate Cards are publicly available; (6) Street Geocoding metadata is proprietary subject to terms of NAVTEQ software license. **Potential Errors:** (1) When overlaying cable plant maps with Land Use maps, there is potential that not all cable strands are properly aligned to the corresponding streets, which in some areas may cause an overestimation of houses passed, and in other areas may cause an underestimation of households passed; (2) Land Use as of 1999, does not account for new housing growth since 1999;¹ (3) Estimates calculated availability if a housing structure is within 200 feet of the cable strand, actual obligation for cable provider to offer service is dictated according to requirements specified in each cable license, of which 200 feet from cable strand was determined to be representative; (4) Use of Incumbent Cable Voice cable plant to estimate Overbuilder Cable Voice availability may over or under estimate actual availability to Overbuilder service.

1.2 Adoption

ILEC Adoption (see Figures 5-6, 13-16, and 42-44; and Tables 4 and 10): **Method:** (a) Statewide subscriber data from FCC Form 477, including statewide split of residential subscribers; (b) regional allocation derived by (b1) allocating wire center distribution of access lines reported in Verizon Service Quality Index Report, then (b2) calculating number of Verizon statewide business lines per employee in Massachusetts; applying statewide coefficient to the number of employees in each region to determine number of business lines in each region, and (b3) obtain estimate of residential lines within each region as a balancing item by subtracting regional business lines as calculated in b2 from total lines in region as calculated in b1; (c) Regional employee data used in b2 is obtained from the total number of employees reported by the Massachusetts Executive Office of Labor and Workforce Development (EOLWD) on 16 Workforce Investment Areas (WIA); (d) add Independent ILECs² (Richmond Telephone Company, Taconic Telephone, and Granby Telephone) residential lines from FCC Form 477 to obtain total ILEC residential lines on region level. **Sources:** (1) Federal Communications Commission (FCC) Form 477, June 2005 through December 2008; (2) Verizon Service Quality Index Report, December 2008; (3) Establishment and Employment by Size, EOLWD, March 2008; (4) US Census 2000 population Tiger files reprocessed through MassGIS, 2003. **Confidentiality of Data:** (1) Massachusetts-specific data gathered through FCC Form 477 is obtained by DTC pursuant to a September 12, 2008 non-disclosure agreement between the DTC and FCC. The FCC produces publicly available semi-annual summaries of Form 477 data, referred to as “Local Telephone Competition and Broadband Deployment”(see <http://www.fcc.gov/wcb/iatd/comp.html>); (2) None, Verizon Service Quality Index Monthly Reports are

¹ This is true for all the methods where this datasource has been used.

² No data are available for Sentinel Tree Company on FCC Form 477.

publicly available; (3) None, data from the EOLWD are publicly available, see <http://lmi2.detma.org/lmi/sizeclass.asp>; (4) None, US Census population data reprocessed through MassGIS is publicly available, see <http://www.mass.gov/mgis/census2000.htm>. **Potential Errors:** The statewide coefficient for the number of employees per Verizon's business lines may not be uniform throughout the regions, therefore regional allocation estimates of ILEC business lines may result in regional inaccuracies.

Cable Voice Adoption (see Figures 7-8, 13-16, and 42-44; and Tables 4 and 10): **Method:** Statewide subscriber data for June 2005 through June 2008 obtained from E911 filings; statewide subscriber data for December 2008 obtained from FCC Form 477; to determine regional allocation of Cable Voice adoption, DTC applied a cable industry-based allocation factor utilizing region-specific distribution of Cable Video adoption, adjusting for those Cable Video communities without Cable Voice offerings. **Sources:** (1) SETB E911 database, June 2005-June 2008; (2) FCC Form 477 December 2008; (3) Annual Cable Franchise Fee Filings, 2005-2008; (4) US Census 2000 population Tiger files reprocessed through MassGIS, 2003. **Confidentiality of Data:** (1) Company-specific data reported to E911 database is proprietary; (2) Massachusetts-specific data gathered through FCC Form 477 is obtained by DTC pursuant to a September 12, 2008 non-disclosure agreement between the DTC and FCC. The FCC produces publicly available semi-annual summaries of Form 477 data, referred to as "Local Telephone Competition and Broadband Deployment" (see <http://www.fcc.gov/wcb/iatd/comp.html>); (3) None, Annual Cable Franchise Fee filings are publicly available; (4) None, US Census population data reprocessed through MassGIS is publicly available, see <http://www.mass.gov/mgis/census2000.htm>. **Potential Errors:** (1) Regional allocation of Cable Voice subscribers assumes uniform timing for availability of Cable Voice offering throughout Massachusetts and also assumes adoption rate for Cable Voice correlates with adoption rate of Cable Video; (2) It is apparent that some companies omitted the number of voice subscribers served via "IP" technology for Form 477 reports prior to December 2008 reporting period, Form 477 is also utilized to determine allocation of voice lines to residential and business subscribers. The FCC revised Form 477 reporting instructions effective for the December 2008 to capture voice subscribers served by both circuit-switch and IP technology. For this reason, estimates of Cable Voice lines serving residential consumers may be over-estimated, and estimates of Cable Voice lines serving SMB consumers may be under-estimated for June 2005 through June 2008, however we do not expect these errors would be significant.

CLEC Adoption (see Figures 9-12, 13-16, and 42-44; and Tables 4 and 10): **Method:** Statewide subscriber data and distribution of residential and business subscribers by platform type (resale, leased facilities, own network) derived from FCC Form 477; regional allocation calculated by regionally allocating each CLEC's utilization of numbers as determined by North American Numbering Plan Administration's (NANPA) Numbering Resource Utilization Forecast (NRUF) database. For those CLECs that do not obtain numbers directly from NANPA, regional allocation of statewide subscribers is a two stage process: (a) the CLEC's service territory is determined upon the zip codes reported as served by the CLEC in FCC Form 477; (b) the statewide subscriber count for the CLEC is allocated according to distribution of the population within the zip codes served by the CLEC. **Sources:** (1) FCC Form 477, June 2005 through December 2008; (2) NRUF database, February 1, 2009; (3) Massachusetts Land Use, 1999, MassGIS; (4) US Census 2000 population Tiger files reprocessed through MassGIS, 2003; (5) Zip Code boundaries obtained from ESRI, Redlands, California, 2007, through MassGIS. **Confidentiality of Data:** (1) Massachusetts-specific data gathered through FCC Form 477 is obtained by DTC pursuant to a September 12, 2008 non-disclosure agreement between the DTC and FCC. The FCC produces publicly available semi-annual summaries of Form 477 data, referred to as "Local Telephone Competition and Broadband Deployment" (see <http://www.fcc.gov/wcb/iatd/comp.html>); (2) Proprietary, DTC entered into non-disclosure agreement with NANPA for company-specific number utilization data; (3) None, MassGIS Land Use data is publicly available, see <http://www.mass.gov/mgis/lus.htm>; (4) None, US

Census population data reprocessed through MassGIS is publicly available, see <http://www.mass.gov/mgis/census2000.htm>; (5) Zip code boundary metadata is proprietary subject to terms of ESRI software license. **Potential Errors:** (1) For those CLECs that do not obtain phone numbers directly from NANPA, allocation is estimated based upon population of zip codes served by each of the providers. Across each region there is no reason to think that error is systemic in one direction; (2) NRUF database may overestimate numbers assigned to carriers in particular areas, as it may include numbers that carriers provide to unaffiliated carriers, such as VoIP providers, resulting in possibility that region allocation estimates may be over-stated in some regions and under-stated in other regions.

1.3 Service Quality

DTC Voice complaints (see Figures 17-19): **Method:** All Voice Complaints derived from DTC Consumer Division database received from January 1, 2005 through December 31, 2008. Complaints sorted by municipality to determine region allocation. “Billing” complaints comprised of the following in-take codes: Billing, Credit, Cramming, Service Denial, Marketing, Rate, Regulation, and Slamming. “Service Quality” complaints comprised of the following in-take codes: Installation, Missed Appointment, and Service Quality. **Sources:** DTC Consumer Division Database. **Confidentiality of Data:** Generally, information regarding complaints made to the DTC is publicly available, except for items containing sensitive personal information (for example, the account number of affected complainant). **Potential Errors:** There were 192 Telecom complaints that could not be mapped, resulting in 2.1% of investigated complaints over the test period that are not accounted for within the Report.

Verizon Trouble Calls (See Figures 20-22): **Method:** For every wire center, Verizon provides monthly reports for the number of lines served and the number of Trouble Calls reported per 100 access lines. For this report DTC calculated the actual number of trouble calls per month per wire center. All wire center data was then assigned to an exchange boundary where possible, however DTC was unable to determine the wire centers serving five exchange boundaries statewide, these exchange boundaries appear as “Incomplete Data.” For region-wide estimates, monthly Trouble Call and access line data was annualized before normalizing for the number of Trouble Calls per 100 access lines. **Sources:** (1) Verizon Monthly Service Quality Index Report filings, 2005-2008; (2) Verizon MA Tariff No. 10 at section 1.6, identification of Verizon exchange boundaries; (3) Community Boundaries Map, MassGIS. **Confidentiality of Data:** (1) None, Verizon monthly Service Quality Index reports are publicly available; (2) None, Verizon tariffs are publicly available; (3) None, MassGIS community boundary data is publicly available, see <http://www.mass.gov/mgis/towns.htm>. **Potential Errors:** (1) The boundaries for wire centers and exchanges may not be coterminous resulting in localized inaccuracies; (2) DTC developed the exchange boundary map by sourcing a paper map; this likely results in localized exchange boundary differences caused by projection errors.

2. Business Wireline Voice Service

2.1 Availability

Total Small and Medium Business Units: **Method:** Aggregate number of businesses with 500 or fewer employees for every zip code for each of the seven regions. **Sources:** (1) Zip Code Business Patterns by Employment Size Class, U.S. Census Bureau, 2006 (note: this database excludes most government employees, railroad employees, and self-employed persons); (2) Zip Code boundaries obtained from ESRI, Redlands, California, USA, 2007, through MassGIS. **Confidentiality of Data:** None, data available from U.S. Census Bureau, see

http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_submenuId=datasets_5&_tabId=EAS2; (2) Zip code boundary metadata is proprietary subject to terms of ESRI software license.

ILEC Availability (see Table 5): **Method:** (a) As "Provider of Last Resort," ILEC is obligated to make reasonable efforts to offer service to every SMB within the ILEC territory; (b) ILEC covered percentage: estimating number of SMBs with access to Verizon's and Independent ILECs' services, by overlaying U.S. Census Bureau 2006 Zip Code level data on the number of SMB establishments with the MassGIS Community Boundaries. **Sources:** (1) Zip Code Business Patterns by Employment Size Class, U.S. Census Bureau, 2006 (note: this database excludes most government employees, railroad employees, and self-employed persons); (2) Zip Code boundaries obtained from ESRI, Redlands, CA, 2007, through MassGIS. (3) Community Boundaries Map, MassGIS. **Confidentiality of Data:** (1) None, data available from U.S. Census Bureau, see

http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_submenuId=datasets_5&_tabId=EAS2, (2) Zip code boundary metadata is proprietary subject to terms of ESRI software license; (3) None, MassGIS community boundary data is publicly available, see <http://www.mass.gov/mgis/towns.htm>.

CLEC Availability (see Figures 23-24): **Method:** (a) From FCC Form 477 December 2007 identify those CLECs providing at least 1,000 lines to SMBs statewide, including via Resale, Leased Facilities, and Own Network platforms. Also from Form 477, carriers identify those zip codes served by the carrier; (b) create CLEC coverage map by calculating the total number of CLECs providing service in each of the zip codes as defined in (a) providing service in each of the zip codes; (c) overlay CLEC coverage map with "Total Small and Medium Business Units" data layer; (d) CLEC covered percentage: calculate percentage of SMBs in each region with access to different number of CLECs. **Sources:** (1) FCC Form 477, December 2007; (2) Zip Code boundaries obtained from ESRI, Redlands, CA, 2007, through MassGIS; (3) Zip Code Business Patterns by Employment Size Class, U.S. Census Bureau, 2006 (note: this database excludes most government employees, railroad employees, and self-employed persons); (4) Community Boundaries Map, MassGIS. **Confidentiality of Data:** (1) Massachusetts-specific data gathered through FCC Form 477 is obtained by DTC pursuant to a September 12, 2008 non-disclosure agreement between the DTC and FCC. The FCC produces publicly available semi-annual summaries of Form 477 data, referred to as "Local Telephone Competition and Broadband Deployment" (see <http://www.fcc.gov/wcb/iatd/comp.html>); (2) Zip code boundary metadata is proprietary subject to terms of ESRI software license; (3) None, data available from U.S. Census Bureau, see http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_submenuId=datasets_5&_tabId=EAS2; (4) None, MassGIS community boundary data is publicly available, see <http://www.mass.gov/mgis/towns.htm>. **Potential Errors:** Map of both SMB locations and CLEC service areas are zip code-based and not building location unit-specific; potential that there are areas within zip codes where an SMB may be located but lack actual service from any CLEC. This results in potential to over-estimate actual number of SMBs with access to CLEC services.

Reseller Covered (see Figures 25-26; and Table 6): **Methodology** is similar to the CLEC Covered. As mentioned in "CLEC Covered," zip code-based service areas are not platform-specific, but company-specific. The Reseller Covered map shows service territories of CLECs with at least 1,000 business lines statewide provided via Resale platform.

Leased Facilities Covered (see Figures 27-28; and Table 7): **Methodology** is similar to the CLEC Covered. As mentioned in "CLEC Covered," zip code-based service areas are not platform-specific, but company-specific. The Leased Facilities Covered map shows service territories of CLECs with at least 1,000 business lines statewide provided via Leased Facilities platform.

Own Network Covered: **Not applicable.** As mentioned in "CLEC Covered," zip code-based service areas are not platform-specific, but company-specific. CLEC Own Network facilities are independent from the

PSTN except for interconnections that allow customers on a CLEC-owned network to communicate with customers on the PSTN. The DTC does not collect, and CLECs are not obligated to provide, specific information on the location of CLEC Own Network facilities.

Cable Voice Covered: **Not Applicable.** Cable Voice service offerings to SMB market emerged on a wide-scale basis in 2008; DTC data was not able to account for this emerging service.

2.2 Adoption

ILEC Adoption (see Figures 29 and 33-36; and Table 8): **Method:** (a) Statewide subscriber data from FCC Form 477, including statewide split of business subscribers; (b) regional allocation derived by (b1) allocating wire center distribution of access lines reported in Verizon Service Quality Index Report, then (b2) calculating number of Verizon statewide business lines per employee in Massachusetts, applying statewide coefficient to the number of employees in each region to determine number of business lines in each region. (c) Regional employee data used in b2 is obtained from the total number of employees reported by the EOLWD on 16 Workforce Investment Areas (WIA); (d) add Independent ILECs³ (Richmond Telephone Company, Taconic Telephone, and Granby Telephone) business lines from FCC Form 477 to obtain total ILEC business lines on region level. **Sources:** (1) FCC Form 477, June 2005 through December 2008; (2) Verizon Service Quality Index Report, June 2005-December 2008; (3) Establishment and Employment by Size, EOLWD, March 2008. **Confidentiality of Data:** (1) Massachusetts-specific data gathered through FCC Form 477 is obtained by DTC pursuant to a September 12, 2008 non-disclosure agreement between the DTC and FCC. The FCC produces publicly available semi-annual summaries of Form 477 data, referred to as “Local Telephone Competition and Broadband Deployment” (see <http://www.fcc.gov/wcb/iatd/comp.html>); (2) None, Verizon Service Quality Index Monthly Reports are publicly available; (3) None, data from the EOLWD are publicly available, see <http://lmi2.detma.org/lmi/sizeclass.asp>. **Potential Errors:** The statewide coefficient for the number of employees per Verizon’s business lines may not be uniform throughout the regions, therefore regional allocation estimates of ILEC business lines may result in regional inaccuracies.

CLEC Adoption (see Figures 30-36; and Table 8): **Method:** Statewide subscriber data and distribution of business subscribers by platform type (resale, leased facilities, own network) derived from FCC Form 477; regional allocation calculated by regionally allocating each CLEC’s utilization of numbers as determined by NRUF database. Exclude Adoption numbers for specific companies, including Level 3 Communications and Global Crossing, which are not providing substantial service to the SMB market. For those CLECs that do not obtain numbers directly from NANPA, regional allocation of statewide subscribers is a two stage process: (a) the CLEC’s service territory is determined upon the zip codes reported as served by the CLEC in FCC Form 477; (b) the statewide subscriber count for the CLEC is allocated according to distribution of employees located within the zip codes served by the CLEC. **Sources:** (1) FCC Form 477, June 2005 through December 2008; (2) NRUF database, February 1, 2009; (3) Zip Code Business Patterns by Employment Size Class, U.S. Census Bureau, 2006 (note: this database excludes most government employees, railroad employees, and self-employed persons). **Confidentiality of Data:** (1) Massachusetts-specific data gathered through FCC Form 477 is obtained by DTC pursuant to a September 12, 2008 non-disclosure agreement between the DTC and FCC. The FCC produces publicly available semi-annual summaries of Form 477 data, referred to as “Local Telephone Competition and Broadband Deployment”, see <http://www.fcc.gov/wcb/iatd/comp.html>; (2) Proprietary, DTC entered into non-disclosure agreement with NANPA for company-specific number utilization data, however 1000-number block level assignments are made publicly available by NANPA; (3) None, data available from

³ No data are available for Sentinel Tree Company on FCC Form 477.

U.S. Census Bureau, see

http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_submenuId=datasets_5&_tabId=EAS2. **Potential Errors:** (1) For those CLECs that do not obtain phone numbers directly from

NANPA, allocation is estimated based upon population of zip codes served by each of the providers. Across each region there is no reason to think that error is systemic in one direction; (2) NRUF database may overestimate numbers assigned to carriers in particular areas, as it may include numbers that carriers provide to unaffiliated carriers, such as VoIP providers, resulting in possibility that region allocation estimates may be over-stated in some regions and under-stated in other regions.

Cable Voice Adoption, 2008 (see Figure 34-36; and Table 8): **Method:** Statewide subscriber data for December 2008 obtained from FCC Form 477; to determine regional allocation of cable voice adoption, DTC applied a cable-industry-based allocation factor utilizing region-specific distribution of cable video adoption, adjusting for those cable video communities without cable voice offerings. For business breakdown of cable voice subscribers, DTC used the statewide percent of business cable voice subscribers as reported in FCC Form 477 as of December 2008. **Sources:** (1) FCC Form 477 December 2008; (2) Annual Cable Franchise Fee Filing, 2008. **Confidentiality of Data:** (1) Massachusetts-specific data gathered through FCC Form 477 is obtained by DTC pursuant to a September 12, 2008 non-disclosure agreement between the DTC and FCC. The FCC produces publicly available semi-annual summaries of Form 477 data, referred to as “Local Telephone Competition and Broadband Deployment” (see <http://www.fcc.gov/web/iatd/comp.html>); (2) None, Annual Cable Franchise Fee filings are publicly available. **Potential Errors:** Regional allocation of Cable Voice subscribers assumes uniform timing for availability of Cable Voice offering throughout Massachusetts and also assumes adoption rate for Cable Voice correlates with adoption rate of Cable Video.

3. Wireless Voice Service

3.1 Availability

Wireless Availability (see Figures 37-39; and Table 9): **Method:** DTC developed Wireless Voice coverage map by overlaying unique coverage maps as reported by individual Wireless Voice carriers. To determine population covered by Wireless Voice service, Wireless Coverage map was overlaid with Land Use map identifying point-specific locations of residential structures and map of population allocation as determined by US Census. To determine amount of terrain covered by Wireless Voice service, Wireless Coverage map was overlaid with map of community boundaries. For illustrative purposes, several state and interstate highways are displayed in Figure 37. **Sources:** (1) Three carriers (AT&T, Sprint Nextel Corporation, and T-Mobile) voluntarily provided statewide wireless voice coverage maps as displayed on each provider’s website as of December 2008; (2) For Verizon Wireless coverage area, DTC aggregated localized snapshots of voice coverage displayed on the carrier’s website in December 2008.; (3) Massachusetts Land Use, 1999, MassGIS; (4) US Census 2000 population Tiger files reprocessed through MassGIS, 2003; (5) Community Boundaries Map, MassGIS; (6) Street Geocoding Data for Massachusetts, NAVTEQ, Chicago, IL, May 2008, through MassGIS. **Confidentiality of Data:** (1 & 2) None, coverage maps publicly available via carrier websites (*see* AT&T Wireless: <http://www.wireless.att.com/coverageviewer/#?type=voice>; Sprint Nextel: <http://coverage.sprint.com/IMPACT.jsp>; T-Mobile: <http://www.t-mobile.com/COVERAGE/>; Verizon Wireless: <http://www.verizonwireless.com/b2c/CoverageLocatorController>); (3) None, MassGIS Land Use data is publicly available, see <http://www.mass.gov/mgis/lus.htm>; (4) None, US Census population data reprocessed through MassGIS is publicly available, see <http://www.mass.gov/mgis/census2000.htm>; (5) None, MassGIS community boundary data is publicly available, see

<http://www.mass.gov/mgis/towns.htm>; (6) Street Geocoding metadata is proprietary subject to terms of NAVTEQ software license. **Potential Errors:** Coverage areas are approximations of outdoor cellular coverage and do not guarantee service in all areas represented, this may result in estimates for population with access and terrain covered to be over-stated.

3.2 Adoption

Wireless Adoption (see Figure 40): **Method:** Statewide subscriber data from FCC Form 477. Regional distribution of subscriber counts determined by rate center proportions of utilized numbers assigned to each carrier according to NRUF database. **Sources:** (1) FCC Form 477, June 2005 through December 2008; (2) NANPA NRUF Database, February 1, 2009; (3) US Census 2000 population Tiger files reprocessed through MassGIS, 2003. **Confidentiality of Data:** (1) Massachusetts-specific data gathered through FCC Form 477 is obtained by DTC pursuant to a September 12, 2008 non-disclosure agreement between the DTC and FCC. The FCC produces publicly available semi-annual summaries of Form 477 data, referred to as “Local Telephone Competition and Broadband Deployment” (see <http://www.fcc.gov/wcb/iatd/comp.html>) (2) Proprietary, DTC entered into non-disclosure agreement with NANPA for company-specific number utilization data, however, 1000-number block level assignments are made publicly available by NANPA; (3) None, US Census population data reprocessed through MassGIS is publicly available, see <http://www.mass.gov/mgis/census2000.htm>. **Potential Errors:** (1) By its nature wireless service is mobile. Utilization of NRUF database for regional allocation merely indicates the assignment of phone numbers and not necessarily where the end-user is utilizing the service; (2) Regional allocation may not be as accurate as could be, because NRUF database may overestimate numbers assigned to carriers, as it may include numbers that carriers provide to unaffiliated carriers, such as VoIP providers; (3) Data presented combines both residential and business wireless subscribers; DTC is not able to calculate residential/business subscriber split of total wireless subscribers. FCC did not instruct wireless carriers to report this split on Form 477 through the June 2008 reporting period.

Wireless Substitution (see Figures 41-44; and Table 10): **Method:** For Wireless Substitution estimate, DTC utilized the Centers for Disease Control and Prevention's (CDC) estimated rate of adults living in wireless-only households within its Northeast Region (includes Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania). DTC applied CDC estimated rate of adults living in wireless-only households to the total Massachusetts population of age 18 and over to obtain number of adults living in wireless-only households. DTC then applied the number of adults living in wireless only households to average number of adults per household to estimate the number of wireless-only households. **Sources:** (1) Centers for Disease Control and Prevention's National Health Interview Survey, July-December 2008, (2) Population estimates derived from American Community Survey, U. S. Census Bureau, 2005-2008, estimates for Massachusetts counties. **Confidentiality of Data:** (1) None, publicly available from CDC, see <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless200905.htm>; (2) ACS estimates are publicly available, see <http://www.census.gov/acs/www/Products/>. **Potential Errors:** Wireless Substitution estimate based on the Northeast region may over- or underestimate wireless substitution taking place in Massachusetts.

Telephone Service Penetration Rates (see Figure 45-46): **Method:** Annual values derived from telephone penetration rate reported in the American Community Survey (ACS). Half-annual estimates based on constructing new data points using average values of annual telephone service penetration rates. **Source:** Estimates derived from American Community Survey, U. S. Census Bureau, 2001-2008, at C25403, Tenure by Telephone Service Available. **Confidentiality of Data:** ACS estimates are publicly available, see <http://www.census.gov/acs/www/Products/>.

4. Video Services

4.1 Availability

Incumbent Cable Video Availability (see Figures 47-55): **Method:** (a) Identification of cable provider within each municipality determined through cable franchise licenses (308 municipalities with at least an Incumbent provider); (b) Number of households passed determined by overlaying electronic street-level cable plant maps with map identifying point-specific locations of residential structures (284 municipalities with electronic cable strand maps); (c) For those communities where no electronic cable plant maps were available (24 municipalities), the Department of Telecommunications and Cable (DTC) estimated number of homes passed as required by cable franchise license agreement. For those municipalities without a full-build-out requirement in franchise agreement, DTC estimated number of households captured within the negotiated density requirement by overlaying Land Use dataset with NAVTEQ Roads data layer. For estimates to determine ratio of housing units passed, DTC utilized Primary Housing Unit data as reported in the US Census 2000 for 6 of the 7 regions (Berkshire, Boston Metro, Central, Northeast, Pioneer Valley, and Southeast). For Cape and Islands region, DTC utilized estimates of primary plus secondary housing units derived from University of Massachusetts Donahue Institute. DTC determined this was necessary because of the relatively high number of seasonal housing units (37%) as a percentage of the total number of housing units within the Cape Islands region. **Sources:** (1) Cable plant maps provided by individual carriers as of Summer 2008; (2) US Census 2000 population Tiger files reprocessed through MassGIS, 2003; (3) Massachusetts Land Use, 1999, MassGIS; (4) Community Boundaries Map, MassGIS; (5) Street Geocoding Data for Massachusetts, NAVTEQ, Chicago, IL, May 2008, through MassGIS; (6) "Housing Units by Tenure and Vacancy Status," UMass Donahue Institute estimates derived from 2000 U.S. Census; (7) Municipal Cable Television Licenses. **Confidentiality of Data:** (1) None, cable plant maps for all cable companies are publicly available per statutory requirement as part of the cable licensing process; (2) None, US Census population data reprocessed through MassGIS is publicly available, see <http://www.mass.gov/mgis/census2000.htm>; (3) None, MassGIS Land Use data is publicly available, see <http://www.mass.gov/mgis/lus.htm>; (4) None, MassGIS community boundary data is publicly available, see <http://www.mass.gov/mgis/towns.htm>; (5) None, (5) Street Geocoding metadata is proprietary subject to terms of NAVTEQ software license; (6) Data from the Donahue Institute is publicly available, see <http://www.massbenchmarks.org/statedata/data.htm>; (7) Licenses are available from municipal cable licensing boards, and collectively from the DTC (see www.mass.gov/dtc). **Potential Errors:** (1) When overlaying cable plant maps with Land Use maps, there is potential that not all cable strands are properly aligned to the corresponding streets, which in some areas may cause an overestimation of houses passed, and in other areas may cause an underestimation of households passed; (2) Land Use as of 1999, does not account for new housing growth since 1999;⁴ (3) Estimates calculated availability if a housing structure is within 200 feet of the cable strand, actual obligation for cable provider to offer service is dictated according to requirements specified in each cable license, of which 200 feet from cable strand was determined to be representative; (4) Use of Incumbent cable plant to estimate Overbuilder availability may over or under estimate actual availability to Overbuilder service; (5) Land Use dataset and Census data reprocessed by MassGIS does not consider secondary housing units, this results in possibility that DTC projection estimates for availability on Cape and Islands region is over-stated.

Overbuilder Cable Video Availability (See Figures 51-55): **Method:** For each region, identify only those municipalities where Overbuilder service from BELD, Norwood, RCN, and/or Verizon FiOS was offered as of December 2007, December 2008, and June 2009. For Overbuilder providers, estimates of housing units with access to service is estimated based upon the location of Incumbent Cable Video plant within those municipalities with at least one Overbuilder present, see "Incumbent Cable Video Availability",

⁴ This is true for all the methods where this datasource has been used.

infra., for further detail regarding estimates of Cable Video availability. **Sources:** (1) Cable plant maps provided by individual carriers as of Summer 2008; (2) US Census 2000 population Tiger files reprocessed through MassGIS, 2003; (3) Massachusetts Land Use, 1999, MassGIS; (4) Community Boundaries Map, MassGIS; (5) Street Geocoding Data for Massachusetts, NAVTEQ, Chicago, IL, May 2008, through MassGIS; (6) Municipal Cable Television Licenses. **Confidentiality of Data:** (1) None, cable plant maps for all cable companies are publicly available per statutory requirement as part of the cable licensing process; (2) None, US Census population data reprocessed through MassGIS is publicly available, see <http://www.mass.gov/mgis/census2000.htm>; (3) None, MassGIS Land Use data is publicly available, see <http://www.mass.gov/mgis/lus.htm>; (4) None, MassGIS community boundary data is publicly available, see <http://www.mass.gov/mgis/towns.htm>; (4) None, (5) Street Geocoding metadata is proprietary subject to terms of NAVTEQ software license; (6) Licenses are available from municipal cable licensing boards, and collectively from the DTC (see www.mass.gov/dtc). **Sources:** (1) Cable Strand maps provided by individual carriers (Charter, Comcast, Cox, Shrewsbury, and Time Warner) as of Summer 2008; (2) MassGIS Land Use to Housing Allocation Data (2000 U.S. Census Bureau housing data allocated over 1999 Land Use ortho imagery). **Confidentiality of Data:** (1) None, cable plant maps utilized for these estimates are publicly available per statutory requirement as part of the cable licensing process. Verizon currently is only licensed cable provider in Massachusetts that has not submitted cable plant maps per statutory requirement for those municipalities where the company is licensed as a cable provider to offer FiOS video service. Verizon alleges it is not under an obligation to submit cable plant maps. (2) None, MassGIS data is publicly available. **Potential Errors:** (1) When overlaying cable plant maps with Land Use maps, there is potential that not all cable strands are properly aligned to the corresponding streets, however there is no reason to think this error is systemic in one direction; (2) Land Use as of 1999, does not account for new housing growth since 1999; (3) Estimates calculated availability if a housing structure is within 200 feet of the cable strand, actual obligation for cable provider to offer service is dictated according to requirements specified in each cable license; (4) Use of Incumbent Cable Video cable plant to estimate Overbuilder Cable Video availability may over or under estimate actual availability to Overbuilder service. Cable plant maps utilized for these estimates are publicly available per statutory requirement as part of the cable licensing process. Verizon currently is only licensed cable provider in Massachusetts that has not submitted cable plant maps per statutory requirement for those municipalities where the company is licensed as a cable provider to offer FiOS video service. Verizon alleges it is not under an obligation to submit cable plant maps. DTC determined that due to market Overbuilder presence of FiOS service, the Overbuilder Cable Video platform availability estimates would be based upon the Incumbent Cable Video availability proxy method.

4.2 Adoption

Incumbent Cable Video Adoption (see Figures 56-66): **Method:** Aggregate carrier-specific subscriber counts for each municipality with cable franchise. **Sources:** (1) Annual Cable Franchise Fee Filing, 2005-2008; (2) US Census 2000 population Tiger files reprocessed through MassGIS, 2003. **Confidentiality of Data:** (1) None, Annual Cable Franchise Fee filings are publicly available from municipal licensing boards and collectively at DTC, see www.mass.gov/dtc; (2) None, US Census population data reprocessed through MassGIS is publicly available, see <http://www.mass.gov/mgis/census2000.htm>.

Overbuilder Adoption (see Figures 56-57, 60-63, and 65-67): **Method:** Aggregate carrier specific subscriber counts for each municipality with cable franchise; (b) Overbuilder Adoption Percentage: number of Overbuilder service subscribers per estimate of total primary housing units covered by Overbuilders. **Sources:** (1) Annual Cable Franchise Fee Filing, 2005-2008; (2) 2000 U.S. Census. **Confidentiality of Data:** (1) None, Annual Cable Franchise Fee filings are publicly available from municipal licensing boards and collectively at DTC, see www.mass.gov/dtc; (2) None, U.S. Census data are publicly available, see <http://www.census.gov/main/www/cen2000.html>.

Satellite Adoption (see discussion at IV. F. 1.): **Method:** Estimate of platform based statewide subscribers to a direct broadcast satellite service. **Source:** (1) Response to DTC Voluntary Request for Data.

Confidentiality of Data: (1) Voluntary responses to data request is publicly available. **Potential Errors:** Data is not audited, was provided as an industry estimate of statewide subscribers.

Over-the-Air Adoption (see discussion at IV. F. 1.): **Method:** Assume all households not subscribing to pay service (either Incumbent, Overbuilder, or Satellite) are receiving video content over-the-air. **Source:** (1) US Census 2000 population Tiger files reprocessed through MassGIS, 2003. **Confidentiality of Data:** (1) None, US Census population data reprocessed through MassGIS is publicly available, see <http://www.mass.gov/mgis/census2000.htm>. **Potential Errors:** Not every household in Massachusetts is receiving video content. Additionally, there may be households receiving video content through broadband service, DTC did not estimate these broadband-only consumers because this is an emerging technology. Due to errors, DTC estimates of over-the-air video content consumers are possibly overstated.

4.3 Service Quality

DTC Cable Video Complaints (see Figures 68-70): **Method:** All Cable Video Complaints derived from DTC Consumer Division database received from January 1, 2005 through December 31, 2008. Complaints sorted by municipality to determine region allocation. “Billing” complaints comprised of the following in-take codes: Billing, Credit, Cramming, Service Denial, Marketing, Rate, and Regulation. “Service Quality” complaints comprised of the following in-take codes: Installation, Missed Appointment, and Service Quality. Complaints were normalized by combining annual Cable Video subscribers for all providers, both Incumbent and Overbuilder. **Sources:** (1) DTC Consumer Division Database; (2) Annual Cable Franchise Fee Filing, 2005-2008. **Confidentiality of Data:** (1) Generally, information regarding complaints made to the DTC is publicly available, except for items containing sensitive personal information (for example, the account number of affected complainant); (2) None, Annual Cable Franchise Fee filings are publicly available from municipal licensing boards and collectively at DTC, see www.mass.gov/dtc. **Potential Errors:** Over the test period, there were 47 complaints that could not be mapped, resulting in 1.3% of complaints that are not accounted for within the Report.

Incumbent Complaints Received (see Figures 71-72): **Method:** All Incumbent Cable Video complaints derived from Annual Form 500 filings for 2005 through 2008. Complaints sorted by municipality to determine region allocation. “Billing” complaints comprised of the following in-take codes: Billing, Defective Notice, and Marketing. “Service Quality” complaints comprised of the following in-take codes: Equipment, Failure to respond to Original Complaint, Installation, Missed Appointment, Programming, Reception, Service Interruption and Service Quality. “Miscellaneous” complaints comprised of the following in-take codes: Other, Other: Damage, and Unable to Contact. Complaints were normalized by combining annual Cable Video subscribers for Incumbent providers. **Sources:** (1) Cable Form 500: Cable Operator’s Annual Report of Consumer Complaints, 2005-2008; (2) Annual Cable Franchise Fee Filing, 2005-2008. **Confidentiality of Data:** (1) Cable Form 500 reports are publicly available from municipal licensing boards; (2) Annual Cable Franchise Fee filings are publicly available from municipal licensing boards and collectively at DTC, see www.mass.gov/dtc.